

WHAT IS CLAIMED IS:

1. An optical detection method for a protein microarray, comprising steps of:
providing a capture molecule;
recognizing a biomolecule on said protein microarray via said capture molecule;
providing a primer to connect with said capture molecule;
amplifying a signal of said primer on said capture molecule via a rolling circle amplification system; and
detecting said amplified signal via a nanoparticle probe.
2. The method according to claim 1 wherein said capture molecule is one selected from a group consisting of an antibody, a biomarker, a protein receptor, a carbohydrate and a peptide.
3. The method according to claim 1 wherein said biomolecule is one selected from a group consisting of an antigen, a ligand, a protein, a carbohydrate and a peptide.
4. The method according to claim 1 wherein said primer is a single-strand oligonucleotide of 20-80 bp.
5. The method according to claim 1 wherein the 5' end of said primer is modified with an amino group to connect with said capture molecule.
6. The method according to claim 1 wherein said rolling circle amplification system comprises a DNA polymerase, a circular template, nucleotides (dNTP) and a buffer system.
7. The method according to claim 6 wherein said circular template has a sequence complementary to said primer to hybridize with said primer.
8. The method according to claim 7 wherein said rolling circle amplification system generates a single-strand DNA molecule connected with said primer

and having tandemly repeats of a sequence complementary to said circular template via said DNA polymerase.

9. The method according to claim 6 wherein said circular template has a nucleotide sequence of 25-100 bp.

10. The method according to claim 1 wherein said nanoparticle probe is a nanoparticle modified with a single-strand oligonucleotide.

11. The method according to claim 10 wherein said nanoparticle is one of a nanogold and a quantum dot.

12. The method according to claim 10 wherein a length of said single-strand oligonucleotide is 10-60 bp.

13. The method according to claim 10 wherein the 5' end of said single-strand oligonucleotide is modified with an -SH group to react strongly with the surface of said nanoparticle.

14. The method according to claim 10 wherein said nanoparticle is a sphere or a polyhedron.

15. An optical detection system for a protein microarray, comprising:
a capture molecule for recognizing a biomolecule on said protein microarray;
a primer for connecting with said capture molecule;
a rolling circle amplification system for amplifying a signal of said primer on said capture molecule; and
a nanoparticle probe for detecting said amplified signal.

16. The method according to claim 15 wherein said primer is a single-strand oligonucleotide of 20-80 bp.

17. The system according to claim 15 wherein the 5' end of said primer is modified with an amino group to connect with said capture molecule.

18. The system according to claim 15 wherein said rolling circle amplification system comprises a DNA polymerase, a circular template, nucleotides (dNTP) and a buffer system.

19. The system according to claim 18 wherein said circular template has a nucleotide sequence of 25-100 bp.

20. The method according to claim 15 wherein said nanoparticle probe is a nanoparticle modified with a single-strand oligonucleotide.

21. The method according to claim 20 wherein said nanoparticle is one of a nanogold and a quantum dot.

22. The method according to claim 20 wherein a length of said single-strand oligonucleotide is 10-60 bp.